Physics 132-002 - Electromagnetism and Optics
Spring 2017
Professor: Dr. Chad A. Middleton

Class Room	Escalante Hall 319
Class Hours	11-11:50 MTWR
Office	Wubben Hall 228A
Office Hours	MW 10-11, TR 9-10, F 12-1
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Course Description

The objective of this course is to provide you with a solid foundation in the physics of electricity, circuits, magnetism, and optics, for students of physics, chemistry, mathematics, and engineering. Through this physics endeavor, you will obtain an increased conceptual understanding of physical phenomena and gain sharpened quantitative analytical skills, which will last with you long after you leave this course.

"Education is what remains after one has forgotten everything he learned in school."
--Albert Einstein

From the catalog...

"Calculus-based introduction to classical electromagnetism and optics. Detailed coverage of electrostatics, electric circuits, magnetism, electromagnetic waves, geometrical optics, and wave optics. The mathematics of calculus and vectors is used throughout. For majors in the sciences and engineering. Requires a mastery of the foundations of classical mechanics as covered in PHYS 131.

Prerequisite: PHYS 131/131L, and MATH 152 or MATH 136 (either may be taken concurrently). A grade of C or higher in PHYS 131/131L is required."
Source: 2016-2017 CMU Catalog, pp. 226

Course Requirements

Assignments

- There will be daily assignments consisting of roughly 2-4 homework problems. Some of these assignments will be collected randomly at the beginning of class.
- Late assignments will not be accepted.

Examinations

- There will be three in-class exams administered throughout the semester and a cumulative final.
- Each exam will consist of several physical problems which will be somewhat similar to those assigned as homework. These problems will be designed to test your problem solving skills as they relate to the course material.
- Exams may contain multiple-choice questions that will be designed to test your conceptual understanding of the material at hand.

Required Text
Physics for Scientists and Engineers: A Strategic Approach, Vols. 3 & 4 by Randall D. Knight; 3rd edition
ISBN: 9780321753175 & 9780321753168

Grading
Your grade for this course is based on the following activities, weighted as shown

Homework Assignments	30%
3 Exams	45%
Final Examination	25%

Grading Scale:
All graded work will be assigned a numerical score. You may estimate your letter grade by computing a percentage score and comparing it with the table below:

%	Grade
100-87	A
86-73	B
72-59	C
58-45	D
44-0	F

Accommodation for Students with Physical and Learning Disabilities
In coordination with Educational Access Services, reasonable accommodations will be provided for qualified students with disabilities. Students must register with the EAS office to receive assistance. Please meet with the instructor the first week of class for information and/or contact Dana VandeBurgt, the Coordinator of Educational Access Services, directly by phone at 248-1801, or in person in Houston Hall, Suite 108.

Academic Integrity
• For CMU policy on such matters, please refer to 2016-2017 CMU Catalog, pp. 46.

Tutorial Learning Center (TLC)
The TLC is a FREE academic service for all Colorado Mesa University students. Tutors are available on a walk-in basis for many courses. Do you have a quick question? Do you need homework clarification or feedback on a paper? Are you reviewing for a test? Help is available at the TLC!

At the main campus, come to Houston Hall 113 to meet with one of our friendly peer tutors. We are open on Monday, Wednesday and Thursday from 8am-6pm; Tuesdays from 8am-7pm, and Fridays from 8am-5pm. Tutoring at branch campuses is also available. Check out the website for schedules and locations at www.coloradomesa.edu/tutoring or call 248-1392 with any questions.

Factors for Success in this Course:

1. **Attendance:** Regular class attendance is expected and strongly recommended. You are responsible for all material discussed in class. It is in your best interest to always attend class and arrive on time, this class begins promptly at 11:00 am!
2. **Reading Preparation:** Topics discussed in class will, for the most part, closely follow the book. A reading of the text will help reinforce the physical concepts presented to you in class. The book also contains several example problems that may prove useful when doing the homework.
3. **Homework:** A true understanding of physics is much more than merely memorizing equations. You must be able to do physics i.e. you must be able to solve physical problems. You should think of every problem as a test of your understanding of the material at hand. Solving the homework problems will help to prepare you for the exams and should not be taken lightly. You are encouraged to discuss homework problems with your

classmates. Working problems with your peers can be an excellent learning method, however, anything turned in must be your own work.

4. **Tutoring:** I am in my office and available to you everyday (see above schedule for times) to answer questions and assist you on any difficulties you may be having with your homework. In addition, CMU offers free tutoring. If you are having difficulty with course material, please see the Tutorial Learning Center.

Classroom Policies and Etiquette:

1. Cell phones are NOT to be used during class!
2. Be attentive and ready to participate in class.
3. Avoid classroom distractions. This includes leaving class during the course time.

Course Calendar

This is a TENTATIVE course calendar ONLY! The actual course can (and most likely will) deviate from the calendar listed below!!

Date	Subject	Reading
Tue, Jan 17	Ch. 25: Electric Charges and Forces	25.1-25.3
Wed, Jan 18	*Pre-Diagnostic Exam*	
Thu, Jan 19	Ch. 25: Electric Charges and Forces	25.4
Mon, Jan 23	Ch. 25: Electric Charges and Forces	25.5
Tue, Jan 24	Ch. 25: Electric Charges and Forces	
Wed, Jan 25	Ch. 26: The Electric Field	26.1-26.2
Thu, Jan 26	Ch. 26: The Electric Field	26.3-26.4
Mon, Jan 30	Ch. 26: The Electric Field	26.5
Tue, Jan 31	Ch. 26: The Electric Field	26.6-26.7
Wed, Feb 1	Ch. 27: Gauss' Law	27.6
Thu, Feb 2	Ch. 28: The Electric Potential	28.1-28.2
Mon, Feb 6	Ch. 28: The Electric Potential	28.4-28.5
Tue, Feb 7	Ch. 28: The Electric Potential	28.6
Wed, Feb 8	Ch. 28: The Electric Potential	28.7
Thu, Feb 9	Ch. 28: The Electric Potential	
Mon, Feb 13	*Review*	
Tue, Feb 14	**Exam 1 (Chapters 25-28)**	
Wed, Feb 15	Ch. 29: Potential and Field	29.1-29.2
Thu, Feb 16	Ch. 29: Potential and Field	29.3-29.4
Mon, Feb 20	Ch. 29: Potential and Field	29.5
Tue, Feb 21	Ch. 29: Potential and Field	29.6
Wed, Feb 22	Ch. 30: Current and Resistance	30.1-30.2
Thurs, Feb 23	Ch. 30: Current and Resistance	30.3
Mon, Feb 27	Ch. 30: Current and Resistance	30.4
Tue, Feb 28	Ch. 30: Current and Resistance	30.5
Wed, Mar 1	Ch. 30: Current and Resistance/ Ch. 31: Fundamentals of Circuits	
Thu, Mar 2	Ch. 31: Fundamentals of Circuits	31.1-31.2
Mon, Mar 6	Ch. 31: Fundamentals of Circuits	31.3-31.4
Tue, Mar 7	Ch. 31: Fundamentals of Circuits	31.5-31.6
Wed, Mar 8	Ch. 31: Fundamentals of Circuits	31.7-31.8
Thu, Mar 9	Ch. 31: Fundamentals of Circuits	
Mon, Mar 13	*Review*	
Tue, Mar 14	**Exam 2 (Chapters 29-31)**	
Wed, Mar 15	Ch. 32: The Magnetic Field	32.1-32.2
Thu, Mar 16	Ch. 32: The Magnetic Field	32.3-32.4

Mon, Mar 20	*Spring Break – No Classes*	
Tue, Mar 21	*Spring Break – No Classes*	
Wed, Mar 22	*Spring Break – No Classes*	
Thu, Mar 23	*Spring Break – No Classes*	
Mon, Mar 27	Ch. 32: The Magnetic Field	32.5, 32.7
Tue, Mar 28	Ch. 32: The Magnetic Field	32.8
Wed, Mar 29	Ch. 32: The Magnetic Field	32.9
Thu, Mar 30	Ch. 32: The Magnetic Field	
Mon, Apr 3	Ch. 33: Electromagnetic Induction	33.1-33.2
Tue, Apr 4	Ch. 33: Electromagnetic Induction	33.3-33.4
Wed, Apr 5	Ch. 33: Electromagnetic Induction	33.5
Thu, Apr 6	Ch. 33: Electromagnetic Induction	
Mon, Apr 10	Ch. 34: Electromagnetic Fields and Waves	34.5-34.6
Tue, Apr 11	Ch. 34: Electromagnetic Fields and Waves	34.7
Wed, Apr 12	*Review*	
Thu, Apr 13	**Exam 3 (Chapters 32-34)**	
Mon, Apr 17	Ch. 20: Traveling Waves	20.5
Tue, Apr 18	Ch. 22: Wave Optics	22.1-22.2
Wed, Apr 19	Ch. 22: Wave Optics	22.3-22.4
Thu, Apr 20	Ch. 22: Wave Optics	
Mon, Apr 24	Ch. 22: Wave Optics	
Tue, Apr 25	Ch. 23: Ray Optics	23.1-23.2
Wed, Apr 26	Ch. 23: Ray Optics	23.3-23.4
Thu, Apr 27	Ch. 23: Ray Optics	23.5-23.6
Mon, May 1	Ch. 23: Ray Optics	23.7-23.8
Tue, May 2	Ch. 23: Ray Optics	
Wed, May 3	*Post-Diagnostic Exam*	
Thu, May 4	*Review*	

Final Exam:** Wednesday, May 10 at 10 - 11:50 am

General Education Objectives:
This course is part of CMU's general education curriculum. Course content is designed to meet the following objectives of CMU's general education program:

1. Understand the structure and discipline of mathematical thought and its use in problem-solving
2. Have knowledge of the natural world and an understanding of scientific methods

Course Learning Objectives:
A student who has taken this course will demonstrate the ability to:

1. Translate between verbal and mathematical descriptions of physical situations. Apply mathematical reasoning, using algebra, trigonometry and calculus, to analyze these situations.
2. Articulate the arguments, verbal and mathematical, used to analyze physical situations.
3. Represent physical processes graphically and describe given graphical representations in physical terms.
4. Use calculus to describe and analyze physical situations.
5. Use the mathematics of vectors, vector algebra, products of vectors and vector components to analyze physical situations.
6. Distinguish between and relate electric charge, forces, fields, potentials and currents.
7. Distinguish between and relate magnetic forces and fields.
8. Describe and use basic concepts associated with waves and the superposition of waves.
9. Determine and use electric fields, electric potentials, electric forces, electrostatic energy, magnetic fields, and

magnetic forces in various physical situations.

10. Use the geometric picture of light to describe the properties of and propagation of light in various physical situations.
11. Use the wave picture of light to describe the properties of and propagation of light in various physical situations, including interference and diffraction phenomena.

Program-Level Student Learning Objectives:
This course satisfies the following Physics-degree student learning objectives:

1. Show fluency with the major fields of physics (classical mechanics, electromagnetism, statistical physics and quantum theory).
2. Use mathematical representations to analyze physical scenarios. This requires translating back and forth between physical and mathematical problems and using appropriate mathematics to aid in the analysis of the scenario.